What is claimed is:

1. A solder alloy material layer composition comprising:

a solder alloy material;

a solvent; and

a wetting agent,

wherein the solder alloy material layer composition is used for forming a solder alloy material layer by a liquid spraying method.

2. A solder alloy material layer composition according to Claim 1, wherein the solder alloy material has a particle size of 50 nm or less.

3. A solder alloy material layer composition according to Claim 1, wherein

a solid content thereof is from 0.01% by mass to 20.0% by mass;

a viscosity thereof is from 1 mPa·s to 20 mPa·s;

a surface tension thereof is from 20 mN/m to 70 mN/m;

a vapor pressure thereof at room temperature is from 0.001 mmHg to 50 mmHg; and

a contact angle thereof is from 30° to 170° with a material which constitutes a liquid spraying nozzle surface.

4. A solder alloy material layer composition according to Claim 3, wherein

the solid content thereof is from 0.1% by mass to 10.0% by

mass;

the viscosity thereof is from 5 mPa·s to 20 mPa·s;

the surface tension thereof is from 25 mN/m to 50 mN/m;

the vapor pressure thereof at room temperature is from 0.01 mmHg to 20 mmHg; and

the contact angle thereof is from 30° to 70° with a material which constitutes a liquid spraying nozzle surface.

5. A solder alloy material layer composition according to Claim 1, produced by a process comprising at least one of:

contacting the solder alloy material with one of supercritical fluid and subcritical fluid;

dissolving the solder alloy material in one of the fluids; and

separating the solder alloy material from one of the fluids.

6. An electroconductive, adhesive composition comprising:

an electroconductive material;

a solvent; and

a wetting agent,

wherein the electroconductive, adhesive composition is used for forming an electroconductive, adhesive layer by a liquid spraying method.

7. An electroconductive, adhesive composition according to Claim 6, wherein the electroconductive material is fine particles of at least

one of gold, silver, copper, electroconductive carbon, electroconductive resin, anisotropic electroconductive resin, solder and indium.

8. An electroconductive, adhesive composition according to Claim 6, wherein

a solid content thereof is from 0.01% by mass to 20.0% by mass;

a viscosity thereof is from 1 mPa·s to 20 mPa·s;

a surface tension thereof is from 20 mN/m to 70 mN/m;

a vapor pressure thereof at room temperature is from 0.001 mmHg to 50 mmHg; and

a contact angle thereof is from 30° to 170° with a material which constitutes a liquid spraying nozzle surface.

9. An electroconductive, adhesive composition according to Claim 8, wherein

the solid content thereof is from 0.1% by mass to 10.0% by mass;

the viscosity thereof is from 5 mPa·s to 20 mPa·s;

the surface tension thereof is from 25 mN/m to 50 mN/m;

the vapor pressure thereof at room temperature is from 0.01 mmHg to 20 mmHg; and

the contact angle thereof is from 30° to 70° with a material which constitutes a liquid spraying nozzle surface.

10. An electroconductive, adhesive composition according to Claim 6, produced by a process comprising at least one of:

contacting the electroconductive material with one of supercritical fluid and subcritical fluid;

dissolving the electroconductive material in one of the fluids; and

separating the electroconductive material from one of the fluids.

11. A flux material layer composition comprising:

a rosin;

an activator; and

a solvent,

wherein the flux material layer composition is used for forming a flux material layer by a liquid spraying method.

12. A flux material layer composition according to Claim 11, wherein the rosin is selected from the group consisting of natural rosin, hydrogenated rosin and a mixture of these rosins and a solute.

13. A flux material layer composition according to Claim 12, wherein the solute is at least one selected from the group consisting of a synthetic resin, a natural rubber, a synthetic rubber and an elastomer.

14. A flux material layer composition according to Claim 12, wherein an amount of the solute in the mixture of rosins and the solute is from 1% by mass to 99% by mass relative to a total mass of the natural rosin and the hydrogenated rosin.

15. A flux material layer composition according to Claim 11, wherein the activator comprises at least one of:

a decomposable and sublimable component which decomposes and sublimates at from 100 °C to 300 °C; and

a decomposable and activatable component which decomposes and becomes active at 350 °C to 400 °C.

16. A flux material layer composition according to Claim 11, wherein an amout of the activator in the flux material layer composition is from 0.1% by mass to 10% by mass relative to a solid component of the flux material layer composition.

17. A flux material layer composition according to Claim 11, wherein

a solid content thereof is from 0.01% by mass to 30.0% by mass;

a viscosity thereof is from 1 mPa·s to 20 mPa·s;

a surface tension thereof is from 20 mN/m to 70 mN/m;

a vapor pressure thereof at room temperature is from 0.001

mmHg to 50 mmHg; and

a contact angle thereof is from 30° to 170° with a material which constitutes a liquid spraying nozzle surface.

18. A flux material layer composition according to Claim 17, wherein

the solid content thereof is from 0.1% by mass to 25.0% by mass;

the viscosity thereof is from 5 mPa·s to 20 mPa·s;

the surface tension thereof is from 25 mN/m to 50 mN/m;

the vapor pressure thereof at room temperature is from 0.01 mmHg to 30 mmHg; and

the contact angle thereof is from 30° to 70° with a material which constitutes a liquid spraying nozzle surface.

19. A flux material layer composition according to Claim 11, produced by a process comprising at least one of:

contacting the electroconductive material with one of supercritical fluid and subcritical fluid;

dissolving the electroconductive material in one of the fluids; and

separating the electroconductive material from one of the fluids.

20. A process for forming a bump comprising the steps of:

forming an intermediate, metallic layer;

forming a solder alloy material layer on the intermediate, metallic layer;

forming a flux material layer on the solder alloy material layer; and

heating and fusing the solder alloy material layer and the flux material layer, wherein the bump is formed on an external electrode pad of a semiconductor device, and wherein the process includes at least one step of:

forming the electroconductive, adhesive layer as the intermediate, metallic layer by liquid-spraying an electroconductive, adhesive composition on the external electrode pad of the semiconductor device, the electroconductive, adhesive composition containing at least:

an electroconductive material;

a solvent; and

a wetting agent;

forming the solder alloy material layer by liquid-spraying a solder alloy material layer composition on the intermediate, metallic layer, the solder alloy material layer composition containing at least:

a solder alloy material;

a solvent; and

a wetting agent; and

forming the flux material layer by liquid-spraying a flux material layer composition on the solder alloy material layer, the

flux material layer composition containing at least:

rosin;

an activator; and

a solvent.

21. A process for forming a bump according to Claim 20, comprising:

forming the solder alloy material layer by liquid-spraying the solder alloy material layer composition on the intermediate, metallic layer; and

forming the flux material layer by liquid-spraying the flux material layer composition on the solder alloy material layer.

22. A process for forming a bump according to Claim 20, wherein, for each of the electroconductive, adhesive composition, the solder alloy material layer composition, and the flux material layer composition,

a solid content thereof is from 0.01% by mass to 30.0% by mass;

a viscosity thereof is from 1 mPa·s to 20 mPa·s;

a surface tension thereof is from 20 mN/m to 70 mN/m;

a vapor pressure thereof at room temperature is from 0.001 mmHg to 50 mmHg; and

a contact angle thereof is from 30° to 170° with a material which constitutes a liquid spraying nozzle surface.

23. A process for forming a bump according to Claim 20, wherein the electroconductive, adhesive composition, the solder alloy material layer composition, and the flux material layer composition are each produced by a process comprising at least one of:

contacting the electroconductive material with one of supercritical fluid and subcritical fluid;

dissolving the electroconductive material in one of the fluids; and

separating the electroconductive material from one of the fluids.

24. A bump forming process comprising:

a solder ball disposing step for disposing solder balls on one side of a substrate so that a position of each solder ball corresponds to a bump forming point on an object on which bumps are to be formed;

an electroconductive, adhesive composition supplying step for supplying an electroconductive, adhesive composition by a liquid spraying method to the bump forming points on the object on which bumps are to be formed;

a positioning step for positioning each solder ball and corresponding bump forming point by placing the substrate against the object on which bumps are to be formed in such a way to bring each solder ball into contact with the corresponding bump forming

point via the electroconductive, adhesive composition;

a solder ball fixing step for fixing the solder ball on the corresponding bump forming point by solidifying the electroconductive, adhesive composition; and

a substrate releasing step for releasing the substrate from a bump which is formed and fixed on the bump forming point on the object.

25. A bump forming process according to Claim 24, wherein the positioning step is carried out to align electrodes on a semiconductor wafer with the solder balls on the substrate by an aligner while the semiconductor wafer and the substrate are being heated, and a collective transferring step is included to collectively transfer the solder balls to the electrodes by mounting the substrate on the semiconductor wafer.

26. A bump forming process according to Claim 24, wherein, for the electroconductive, adhesive composition,

a solid content thereof is from 0.01% by mass to 20.0% by mass;

a viscosity thereof is from 1 mPa·s to 20 mPa·s;

a surface tension thereof is from 20 mN/m to 70 mN/m;

a vapor pressure thereof at room temperature is from 0.001 mmHg to 50 mmHg; and

a contact angle thereof is from 30° to 170° with a material

which constitutes a liquid spraying nozzle surface.

27. A bump forming process according to Claim 24, wherein the electroconductive, adhesive composition is produced by a process comprising at least one of:

contacting the electroconductive material with one of supercritical fluid and subcritical fluid;

dissolving the electroconductive material in one of the fluids; and

separating the electroconductive material from one of the fluids.

28. A bump obtainable by a process comprising:

forming an intermediate, metallic layer on an external electrode pad of a semiconductor device;

forming a solder alloy material layer by liquid-spraying a solder alloy material layer composition on the intermediate, metallic layer, the solder alloy material layer composition containing at least:

a solder alloy material;

a solvent; and

a wetting agent;

forming the flux material layer by liquid-spraying a flux material layer composition on the solder alloy material layer, the flux material layer composition containing at least:

rosin;

an activator; and

a solvent; and

heating and fusing the solder alloy material layer and the flux material layer.

29. A bump according to Claim 28, wherein, for each of the solder alloy material layer composition and the flux material layer composition,

a solid content thereof is from 0.01% by mass to 30.0% by mass;

a viscosity thereof is from 1 mPa·s to 20 mPa·s;

a surface tension thereof is from 20 mN/m to 70 mN/m;

a vapor pressure thereof at room temperature is from 0.001 mmHg to 50 mmHg; and

a contact angle thereof is from 30° to 170° with a material which constitutes a liquid spraying nozzle surface.

30. A bump according to Claim 28, wherein the solder alloy material layer composition and the flux material layer composition are each produced by a process comprising at least one of:

contacting the electroconductive material with one of supercritical fluid and subcritical fluid;

dissolving the lectroconductive material in one of the fluids; and

separating the lectroconductive material from one of the

fluids.

31. A bump according to Claim 28, wherein the intermediate, metallic layer is an electroconductive, adhesive layer formed by spraying a liquid of electroconductive, adhesive composition comprising:

an electroconductive material;

a solvent; and

a wetting agent,

onto the external electrode pad in the semiconductor device.

32. A bump according to Claim 31, wherein, for the electroconductive, adhesive composition,

a solid content thereof is from 0.01% by mass to 20.0% by mass;

a viscosity thereof is from 1 mPa·s to 20 mPa·s;

a surface tension thereof is from 20 mN/m to 70 mN/m;

a vapor pressure thereof at room temperature is from 0.001 mmHg to 50 mmHg; and

a contact angle thereof is from 30° to 170° with a material which constitutes a liquid spraying nozzle surface.

33. A bump according to Claim 31, wherein the electroconductive, adhesive composition is produced by a process comprising at least one of:

contacting the electroconductive material with one of supercritical fluid and subcritical fluid;

dissolving the lectroconductive material in one of the fluids; and

separating the lectroconductive material from one of the fluids.

34. A bump according to Claim 28, having a diameter of 30 μm or less.

35. A bump according to Claim 34, having a diameter of 0.001 μm to 10 μm.

36. A bump according to Claim 34, having a diameter of 0.001 μm to 1 μm.

37. A bump according to Claim 28, having a shear strength of 8 kgf or more and a tensile strength of 1000 kgf or more.

38. A solder ball transferring sheet comprising:

a substrate; and

bumps disposed at given positions on one side of the substrate.

39. A solder ball transferring sheet according to Claim 38, further

comprising:

an electroconductive, adhesive composition supplied on the bumps by a liquid spraying method.

40. A solder ball transferring sheet according to Claim 39, wherein, for the electroconductive, adhesive composition,

a solid content thereof is from 0.01% by mass to 20.0% by mass;

a viscosity thereof is from 1 mPa·s to 20 mPa·s;

a surface tension thereof is from 20 mN/m to 70 mN/m;

a vapor pressure thereof at room temperature is from 0.001 mmHg to 50 mmHg; and

a contact angle thereof is from 30° to 170° with a material which constitutes a liquid spraying nozzle surface.

41. A solder ball transferring sheet according to Claim 39, wherein the electroconductive, adhesive composition is produced by a process comprising at least one of:

contacting the electroconductive material with one of supercritical fluid and subcritical fluid;

dissolving the electroconductive material in one of the fluids; and

separating the electroconductive material from one of the fluids.

42. A semiconductor device comprising:

an intermediate metallic layer;

a bump formed on the intermediate metallic layer; and

an external electrode pad on which the intermediate metallic layer is formed,

wherein the bump is formed by a liquid spraying method and have a diameter of 30 μm or less.

43. A semiconductor device according to Claim 42, wherein the bump is formed by:

heating and fusing a solder alloy material layer and a flux material layer,

wherein the solder alloy material layer is formed by liquid-spraying a solder alloy material layer composition on the intermediate, metallic layer, the solder alloy material layer composition containing at least:

a solder alloy material;

a solvent; and

a wetting agent; and

the flux material layer is formed by liquid-spraying a flux material layer composition on the solder alloy material layer, the flux material layer composition containing at least:

rosin;

an activator; and

a solvent.

44. A semiconductor device according to Claim 43, wherein, for each of the solder alloy material layer composition and the flux material layer composition,

a solid content thereof is from 0.01% by mass to 30.0% by mass;

a viscosity thereof is from 1 mPa·s to 20 mPa·s;

a surface tension thereof is from 20 mN/m to 70 mN/m;

a vapor pressure thereof at room temperature is from 0.001 mmHg to 50 mmHg; and

a contact angle thereof is from 30° to 170° with a material which constitutes a liquid spraying nozzle surface.

45. A semiconductor device according to Claim 43, wherein the solder alloy material layer composition and the flux material layer composition are each produced by a process comprising at least one of:

contacting the electroconductive material with one of supercritical fluid and subcritical fluid;

dissolving the electroconductive material in one of the fluids; and

separating the electroconductive material from one of the fluids.

46. A semiconductor device according to Claim 43, wherein the

intermediate, metallic layer is an electroconductive, adhesive layer formed by spraying a liquid of electroconductive, adhesive composition onto the external electrode pad in the semiconductor device, the electroconductive, adhesive composition comprising:

an electroconductive material;

a solvent; and

a wetting agent.

47. A semiconductor device according to Claim 46, wherein, for the electroconductive, adhesive composition,

a solid content thereof is from 0.01% by mass to 20.0% by mass;

a viscosity thereof is from 1 mPa·s to 20 mPa·s;

a surface tension thereof is from 20 mN/m to 70 mN/m;

a vapor pressure thereof at room temperature is from 0.001 mmHg to 50 mmHg; and

a contact angle thereof is from 30° to 170° with a material which constitutes a liquid spraying nozzle surface.

48. A semiconductor device according to Claim 46, wherein the electroconductive, adhesive composition is produced by a process comprising at least one of:

contacting the electroconductive material with one of supercritical fluid and subcritical fluid;

dissolving the electroconductive material in one of the fluids;

and

separating the electroconductive material from one of the fluids.

49. A semiconductor device according to Claim 42, wherein the bumps have a diameter of 0.001 μm to 10 μm.

50. A semiconductor device according to Claim 42, wherein the bumps have a diameter of 0.001 μm to 1 μm.

51. A semiconductor device according to Claim 42, wherein the bumps have a shear strength of 8 kgf or more and tensile strength of 1000 kgf or more.

52. A semiconductor device comprising bumps, wherein the bumps are formed by a bump forming process comprising:

a solder ball disposing step for disposing solder balls on one side of a substrate so that a position of each solder ball corresponds to a bump forming point on an object on which bumps are to be formed;

an electroconductive, adhesive composition supplying step for supplying an electroconductive, adhesive composition by a liquid spraying method to the bump forming points on the object on which bumps are to be formed;

a positioning step for positioning each solder ball and

corresponding bump forming point by placing the substrate against the object on which bumps are to be formed in such a way to bring each solder ball into contact with the corresponding bump forming point via the electroconductive, adhesive composition;

a solder ball fixing step for fixing the solder ball on the corresponding bump forming point by solidifying the electroconductive, adhesive composition; and

a substrate releasing step for releasing the substrate from a bump which is formed and fixed on the bump forming point on the object,

wherein the bumps have a diameter of 30 μm or less.

53. A semiconductor device according to Claim 52, wherein, for the electroconductive, adhesive composition,

a solid content thereof is from 0.01% by mass to 20.0% by mass;

a viscosity thereof is from 1 mPa·s to 20 mPa·s;

a surface tension thereof is from 20 mN/m to 70 mN/m;

a vapor pressure thereof at room temperature is from 0.001 mmHg to 50 mmHg; and

a contact angle thereof is from 30° to 170° with a material which constitutes a liquid spraying nozzle surface.

54. A semiconductor device according to Claim 52, wherein the electroconductive, adhesive composition is produced by a process

comprising at least one of:

contacting the electroconductive material with one of supercritical fluid and subcritical fluid;

dissolving the lectroconductive material in one of the fluids; and

separating the lectroconductive material from one of the fluids.